



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/002,317	10/25/2001	Thomas K. Wood	9842-273-999	2979
24341	7590	01/30/2004		
MORGAN, LEWIS & BOCKIUS, LLP. 3300 HILLVIEW AVENUE PALO ALTO, CA 94304			EXAMINER MARX, IRENE	
			ART UNIT	PAPER NUMBER

1651

DATE MAILED: 01/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/002,317

Applicant(s)

WOOD ET AL.

Examiner

Irene Marx

Art Unit

1651

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) 1-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 24-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Art Unit: 1651

The amendment filed 11/12/03 is acknowledged. Claims 24-43 are being considered on the merits.

Claims 1-23 are withdrawn from consideration as directed to a non-elected invention.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 27 and 37 are/remain rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 27 is/remains vague and indefinite in the recitation of "mild steel 1010". This does not appear to be a term of art, and it is unclear what this terminology is intended to encompass.

Applicant's contention that this constitutes a particular grade of steel is noted. However, the nature of this grade of steel is not of record.

Claim 37 is improperly dependent on claim 24 and lacks antecedent basis in claim 24 for "the metal". Claim 24 is a method claim not a composition claim.

Claim 37 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Art Unit: 1651

Claims 24-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jayaraman *et al.* (1997) taken with Sekine *et al.* and Hardoyo *et al.*.

The claims are directed to reduction of corrosion by providing a metal and applying on an exterior surface a protective bacterial biofilm that reduces corrosion formed by a bacterium that secretes a polyanionic chemical composition such as polyphosphate.

Jayaraman *et al.* disclose the reduction of corrosion by providing a metal and applying on an exterior surface a protective bacterial biofilm that reduces corrosion formed by a bacterium, such as *E. coli* (See, e.g., page 64, et seq.).

The reference differs from the claimed invention in that the reference is silent regarding the secretion of a polyanionic chemical composition by the biofilm forming bacteria, including genetically engineered bacteria.

However, it is well known in the art that anionic polymers reduce corrosion, as adequately demonstrated by Sekine *et al.* (See, e.g., page 3173, Conclusions). In addition, Hardoyo *et al.* disclose an *E. coli* strain which has been genetically engineered to secrete polyphosphate, a polyanionic chemical composition. One of ordinary skill in the art would reasonably have expected this strain to also produce a protective biofilm.

Accordingly, one of ordinary skill in the art would have had a reasonable expectation of success in using a biofilm forming *E. coli* that secretes polyphosphate in a process of reducing corrosion on a surface of any metal including aluminum, copper, titanium, nickel, alloys thereof and various types of steel. In addition one of ordinary skill in the art would have reasonably expected that a bacterial biofilm would protect the surface of these metals when immersed in liquids such as culture media or artificial seawater. See, e.g., Jayaraman *et al.* Fig 1a, b, page 64, wherein biofilms on steel are tested in Luria-Bertani medium.

In addition, the adjustment of the thickness of the biofilm by optimization of conditions such as culture media and length of growth of the bacteria, identified as result-effective variables cited in the references would have been prima facie obvious to a person having ordinary skill in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to modify the process of reduction of corrosion disclosed by Jayaraman *et al.* by substituting a bacterium that secretes a polyanionic chemical composition

Art Unit: 1651

such as polyphosphate, as suggested by the teachings of Sekine *et al.* and Hardoyo *et al.* for the expected economic benefits of minimizing losses due to metal corrosion by optimizing the protective properties of bacterial biofilms on metals vulnerable to corrosion by addition of polyanionic polymers.

Thus, the claimed invention as a whole was clearly *prima facie* obvious, especially in the absence of evidence to the contrary.

Response to Arguments

Applicant's arguments have been fully considered but they are not deemed to be persuasive.

Applicant argues that Jayaraman does not teach each and every limitation of claim 24 and dependent claims 25-34. With all due respect, it is noted that the rejection made is not an anticipation rejection, but rather an obviousness rejection. Also, Applicant has argued and discussed the references individually without clearly addressing the combined teachings. It must be remembered that the references are relied upon in combination and are not meant to be considered separately as in a vacuum. It is the combination of all of the cited and relied upon references which make up the state of the art with regard to the claimed invention. Applicant's claimed invention fails to patentably distinguish over the state of the art represented by the references.

With respect to the differences in reducing corrosion of mild steel 1018 rather than 1010 as disclosed by Jayaraman cannot be readily ascertained, since the specific properties of these steels is not available on this record. Regarding the absence of secretion of a polyanion and specifically of polyphosphate by bacteria or genetically engineered bacteria, it is noted that the claimed invention merely requires reduction of corrosion. Applicant appears to rely on the results in the specification to distinguish the invention. However, from Table II, it can be seen that Applicant's invention pertains to the use of a specific genetically engineered strain of *E. coli* in the formation of protective biofilms to reduce corrosion. Applicant has not demonstrated unexpected results stemming from the secretion of a polyanion in an undisclosed amount by a few of the bacteria comprised in the biofilm.

In response the applicant's argument that Hardoyo does not teach the release of polyphosphates, it is noted that this reference uses precisely the same strain MV1184(pBC29,

Art Unit: 1651

pEP02.2) that is touted in the instant invention as providing superior results (Hardoyo, page 3488, Specification page 19). Therefore, one of ordinary skill in the art would reasonably have expected this strain to likewise release polyphosphates. See also, page 3488, paragraph 2 for the explicit release of polyphosphate. Sekine is relied upon for its teachings that anionic polymers, such as the polyphosphates produced by Hardoyo are effective in reducing corrosion as claimed. Therefore, applicant has not rebutted the strong *prima facie* case of obviousness made out over the reference. Accordingly, the rejection is deemed proper and it is adhered to.

No claim is allowed.

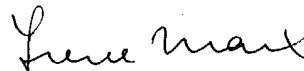
THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Irene Marx whose telephone number is 571-272-0919. The examiner can normally be reached on M-F (6:30-3:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael G. Wityshyn can be reached on (571) 272-0926. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-9000.



Irene Marx
Primary Examiner
Art Unit 1651